

River Channel Velocities

Expectation:	Mean channel velocities ranging between 0.2-0.6 m/sec (0.8-1.8 ft/sec) when flows are contained within channel banks ($Q \alpha 40 - 57 \text{ cms} / 1400 - 2000 \text{ cfs}$).
Author:	Joanne Chamberlain, South Florida Water Management District Joann Mossa, University of Florida, Department of Geography
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Relevant Endpoints:	Restoration - Physical Integrity - Hydrology Restoration - Physical Integrity - Hydrogeomorphic Processes Restoration - System Functional Integrity - Habitat Quality Restoration - System Functional Integrity - Persistence
Baseline Conditions:	<p>Baseline conditions were derived from daily discharge at site PC33 on Micco Bluff Run in Pool C and stream gauging data collected in other Pool C river runs (sites 14.062, 14.085, 16.100). Data from these sites are representative of existing conditions (November 1997 - May 1999) within remnant river sections of the area that will be affected by the first Phase of restoration.</p> <p>Mean channel velocity was calculated by dividing mean discharge by the cross sectional area. Data from PC33 indicate that daily flows ranged from 0 to 33 cms (1170 cfs) with discharges greater than 2.8 cms (100 cfs) occurring only 5% of the time. Mean velocities ranged from 0.0 to 0.49 cm/s (1.61 ft/sec). However because remnant channels rarely conveyed discharge, velocities ranged between 0.2-0.6 m/sec (0.8-1.8 ft/sec) less than 0.5% of the baseline period. Mean channel velocities calculated from instantaneous discharge data were similar in other remnant river channels in Pool C.</p>
Reference Conditions:	Reference conditions were derived from historic stream gauging data at Kissimmee River below Lake Kissimmee (USGS site 2269000), Kissimmee River near Cornwell/Bassinger (USGS site 2272500) and Kissimmee River near Okeechobee (USGS site 2273000) from 1950 - 51. When flows were within channel banks, velocities within the river ranged between 0.2 to 0.6 m/sec (0.8-1.8 ft/sec) (Huber 1976). Velocities typically remained in this range until discharges exceeded 40-57 cms (1400-2000 cfs), when flows were predominantly out of bank.
Mechanism for Achieving Expectation:	<p>Restoration of the physical form of the river, through backfilling C38 and carving new river segments, will direct flows through the Kissimmee River.</p> <p>Regulation schedules and operation rules for downstream control structures (S65C and S65D) will be modified to replicate historic surface water slopes and associated velocities along the restored river. New regulation schedules and operation rules for S65C and S65D will be based on historic stage-discharge relationships at these locations. Downstream water levels will be managed to control the slope of the surface water profile and thereby preventing high velocities. S65C will be the downstream control for the first phase of restoration. S65D will serve as the downstream control of the complete restoration project.</p>
Adjustments for External Constraints:	None

Means of Evaluation: Average velocities in the restored channel will be compared to the range of historic values. Discharge will be collected at four sites (PC11, PC33, PC43, and PC54) in river channels throughout Pool C. PC33 collects continuous stage, velocity, and discharge data. Sites PC11, PC43, and PC54 collect continuous stage data. Discharge at these sites will be measured using an Acoustic Doppler Current Profiler (ADCP) at least twice a month when flows are greater than 100 cfs. Detailed surveys of the channel cross sections at these sites will be collected at least twice a year to monitor changes to hydraulic geometry. River channel velocities will be calculated by dividing discharge by the cross sectional area and compared to the expected range derived from historic values.

Time Course: Reestablishment of the historic range of inbank mean channel velocities will be initiated with restoration of the physical form of the Kissimmee River and modifications to water level operations at downstream control points (i.e., S65C & S65D). Evaluations will begin with the first year of data after the completion of phase I backfilling and will continue annually until completion of phase 2/3 of the restoration project.

References

Huber, H.C., J.P. Heaney, P.B. Bedient, and J.P. Bowden. 1976. Environmental resources management studies in the Kissimmee River basin. Final Report. Dept. Environ. Eng. Science, Univ. Florida, Gainesville, FL. ENV-05-76-2. 279 pp.